



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

ADDITIONAL NOTES ON THE CLADOCERA OF NEBRASKA

By CHARLES FORDYCE

WITH ONE PLATE

Since the appearance of the first paper on the Cladocera of Nebraska (Fordyce, 1901), the author has been extending his survey of the state and making collection in localities not covered in the previous report; aside from the material obtained by personal effort, acknowledgments are due to Dr. R. H. Wolcott and Miss Caroline E. Stringer for some valuable collections furnished by them. An examination of the material reveals nineteen species in addition to the twenty-six with which the former paper dealt, making a total of forty-five species thus far reported from Nebraska. These additional species are distributed among the following two families: Daphnidæ 9, and Lynceidæ 10.

BIOLOGICAL CONDITIONS

The bodies of water from which these collections were made vary greatly in their characteristics. The station at Valentine is in the form of a large mill pond on the Minichaduza River, located about two miles north of the village. The water is cold, clear and has a depth varying from two to five meters. The phytoplankton and the higher aquatic plants are abundant. The pond is well located and especially adapted for zooplankton, but for the fact that the stream is swift, giving the water found in the mill dam an appreciable current which doubtless carries away many of the forms. Not only the species shown in the subjoined table, but many reported in the table of 1901, flourish here.

Little Alkali Lake lies about thirty-five miles south of Valentine in one of the most interesting lacustrine districts of our state. The elevation here is about fourteen hundred meters above the sea level. The lake is about five hundred meters in diameter, and attains the depth of two to three meters. The plant life is not abundant; a few clusters of cat-tails and rushes represent the higher aquatic plants,

while the algae are confined to a few Volvocinae and to a few Diatomaceae.

Hackberry Lake is a broad sheet of water lying three miles northwest of Little Alkali Lake. It has an average diameter of about four thousand five hundred meters and a depth of from one to two meters. The water contains an abundance of higher aquatic plants, as well as the lower forms; *Spirogyra*, *Zygnema*, and other types of filamentous algae are in great abundance.

St. Mary's Lake is located seven and one-half miles south of Aurora. It has a diameter of about four hundred and fifty meters with a depth rarely exceeding one meter. The bed is composed of rich alluvial soil with an abundant growth of rushes and other higher plants. The phytoplankton is scarce; *Closterium* among the desmids, and two or three types of Volvocinae are the leading representatives.

The collecting ground at Sidney is a small shallow lake one and a half miles southwest of town. The region is generally sandy with a vegetable plankton confined almost wholly to diatoms. The zooplankton is represented by two genera, *Alona* and *Chydorus*.

The material from York was found in a small turbulent pond on the east side of the city. The water is poorly lighted and almost destitute of plant life. *Moina brachiata* is the only cladoceron in the collection; this is not abundant.

Pilger Lake is a body of water in the form of a "cut-off" on the Elkhorn River at a point one mile east of Pilger. The lake contains many higher plants, and among the lower *Fragillaria* and *Oscillaria* are very abundant; the Rotatoria are also very numerous. The zooplankton is rich in numbers.

Stringer's Lake is a small sheet of water, located two miles east of Wayne. The lake is spring fed, comparatively cold, and very poor in vegetable plankton. The animal plankton, like the vegetable plankton, is limited.

The following table indicates the geographic distribution of species found so far as these are new to Nebraska; *Pleuroxus uncinatus* Baird is new to this country and the following are new to science:

Daphnia magna var. *americana*.

Leydigia trichura.

DAPHNIDAE	Valentine	Little Alkali Lake	Hackberry Lake	York	St. Mary's Lake	Sidney	Pilger's Lake	Stringer's Lake
1. <i>Daphnia pulex</i> , var. <i>nasutus</i> Herrick.....								
2. <i>Daphnia magna</i> var. <i>americana</i> n. var.....		*			*			
3. <i>Daphnia schoedleri</i> Sars.....			*					
4. <i>Daphnia carinata</i> King.....								
5. <i>Simocephalus serrulatus</i> Koch.....								*
6. <i>Ceriodaphnia censors</i> Birge.....			*					
7. <i>Ceriodaphnia megops</i> Sars.....					*			
8. <i>Ceriodaphnia reticulata</i> Jur.....	*							
9. <i>Moina brachiata</i> Jur.....				*				
LYNCEIDAE								
10. <i>Alona costata</i> Sars.....								
11. <i>Alona intermedia</i> Sars.....	*					*		
12. <i>Alonella excisa</i> Fisch.....					*			
13. <i>Alonopsis media</i> Birge.....					*			
14. <i>Alonopsis latissima</i> Kurz.....	*							
15. <i>Camptocercus rectirostris</i> Schoedlr.....								
16. <i>Leydigia quadrangularis</i> Leyd.....							*	
17. <i>Leydigia trichura</i> n. sp.....					*		*	
18. <i>Pleuroxus uncinatus</i> Baird.....			*					
19. <i>Chydorus globosus</i> Baird.....	*					*		*

DAPHNIA MAGNA var. AMERICANA n. var.

Plate VI, fig. 1

Daphnia magna Strauss is described quite in detail by Richard (96: 192-197; Pls. 20, fig. 1; 24, figs. 6, 13); the species is very generally distributed over the Old World, but up to this time, as far as can be learned, is not reported from America. Since this species has very pronounced variations dependent upon food and the different biological conditions under which it has been found it is not without hesitation that the writer suggests a new variety; the representatives of the species here are, however, so remote and under such different environmental conditions from their kindred in the Orient that such wide variations in characteristics as have been found are not unexpected.

The female has an average length of 3.5 to 4.5 mm. and a height of 2.5 to 3 mm. The carapace is very distinctly sculptured with fine, quadrate areas: the caudal spine is in the line of the dorsal mar-

gin and spinulose, while in many specimens it curves ventrad (fig. 1): in length it is very variable and in old females absent. The ventral margin is decidedly more convex than the dorsal, both being armed from near the middle posteriad with spinules of increasing length: the spinules of the ventral series are continued on the caudal margin, where they are very thickly set: along the middle of the ventral margin for an interval equal to about one-tenth its total length is found a series of very fine plumose hairs. There is no appreciable sinus between the head and the body. The upper and anterior margins of the head are uniformly curved, there being a slight projection below and in front of the eye and a noticeable concavity in the ventral margin between the head and the beak. The antennae of the first pair are conical and reach the extremity of the beak; the sensory hairs are coarse, short and rarely exceed seven in number. The fornix is very prominent, the eye medium in size with large distinct lenses; the pigment fleck is small and triangular. The antennae of the second pair are strong and spinulose, the apical end of the basilar joint, as well as each articulation of the rami, is furnished with short teeth; the dorsal margin of the ventral ramus and that of the distal articulation of the dorsal are provided with long sparsely set hairs. The swimming setae are biarticulate and densely plumose, the hairs being set almost perpendicularly to the shaft. The digestive canal is of the usual daphnid type with the gastric caeca long and convoluted: the most characteristic feature of this species is the post-abdomen, the dorsal margin of which is interrupted near its lower part by a sinuosity: there are from nineteen to twenty-three anal teeth, of which seven to nine lie below the sinuosity and twelve to fourteen above; these teeth decrease in length dorsad in each series; besides these teeth the post-abdomen is densely studded with sharp spinules which are in the lower half grouped in twos and threes. The terminal claws are long, distinctly curved, and provided with two combs of fine secondary teeth on the proximal half and a series of fine spinules on the distal. There are four abdominal processes, the anterior being long, slender and curved forward, the second is heavy conical and about half as long as the first; the last two are short nodules and like the second distinctly spinulose. The abdominal setae are short and biarticulate, with the distal portion plumose.

The males are about half as large as the females, measuring 2 to 2.75 mm. long and 1 to 1.4 mm. high. The plumose hairs of the

ventral margin extend forward to the head. The eye is comparatively larger than it is in the female and is set farther forward, giving the anterior margin of the head in some instances a prominent bulging outwards. The antennae of the first pair are large, club-shaped and provided at the antero-distal point with a long curved flagellum, whose outer half is thickly beset with fine hairs. The sensory hairs emerging from the middle of the distal end of the antenna are few and very coarse; the body of the antenna is slightly serrate. The claw of the first foot is extremely long, having the length of 0.7 to 1 mm.; this foot is furnished also with a long flagellum. The post-abdomen is curved forward on its anterior margin and has a deeper sinuation in the posterior margin than is seen in the female. The teeth on this posterior margin differ from those in the female, there being only eleven above the sinuation, while there are fourteen to sixteen very small ones below.

Comparisons

D. magna Strauss.

1. Valves often as broad as long.
2. Size—female 4 to 5 mm. long.
3. Forehead not prominent.
4. Anterior margin of head straight.
5. First antenna does not reach the extremity of the beak.
6. Abdominal processes all hairy.
7. Post-abdominal teeth of
 - (a) distal series 4 to 6,
 - (b) proximal series 10 to 12.
 - (c) Teeth equal in length.

D. magna var. *americana* n. var.

- Never.
 Size 3.5 to 4.5 mm.
 Prominent.
 Convex.
 Reaches extremity.
 Posterior three only.
 (a) 7 to 10,
 (b) 12 to 14.
 Decreasing dorsad.

LEYDIGIA TRICHURA n. sp.

Plate VI, figs. 2, 3

Female.—This species attains a length of 0.8 mm. and a height of 0.55 mm. The general form is elliptical and very similar to *L. fimbriata* Fordyce (OI: 161-162, Pl. 23, figs. 11 to 14). The dorsal margin of the carapace is nearly straight in its middle third; the margins of the rest of the valve are uniformly curved (fig. 2). The ventral margin is ornamented through its entire length with

densely set plumose hairs: the ventral fourth of the posterior margin is provided with short, fine spinules. The valves are indistinctly marked by longitudinal striae. The head is comparatively large and projects obliquely downward, the forehead being nearly straight. The eye is small and approaches the anterior margin of the head, the crystalline lenses are buried in the pigment; the pigment fleck is triangular, about fifty per cent larger than the eye and is above the middle point between the eye and the rostrum. The antennae of the first pair are prominent, fusiform, and inserted immediately under the pigment fleck; they extend considerably below the extremity of the rostrum. The sensorial hairs are few and about half as long as the body of the antenna, from whose anterior margin long, straggling, stiff hairs emerge. The antennae of the second pair are robust and when flexed reach nearly two-thirds the distance to the posterior margin of the carapace. They are ungraceful in appearance, having a stunted basilar joint much constricted at the proximal end. The rami are almost equal in length, each having three apical, biarticulate, and sparsely plumose swimming setae; a strong sharp thorn accompanies each set of setae. A brush of similar thorns diverges from the antero-distal part of the first and second articulations of the ventral ramus, two appear on the anterior margin of the first article of the ventral ramus and one emerges from the extero-distal end of the first article of the dorsal ramus.

The digestive canal is convoluted and has a very narrow lumen. The post-abdomen is very prominent, having both the anterior and posterior margins convex, the latter being conspicuously curved and armed with several series of spines and thorns. From the distal half of this margin there come eight or nine long curved spines decreasing in length dorsad (fig. 3); each is fortified at the exterior side of its base by one or two short curved spines. The series of long spines is continued dorsad by a row of fifteen to sixteen shorter straight ones. The series of anal spines just mentioned is set in considerably from the margin. The interval immediately along the dorsal edge between the lateral rows of spines is densely studded with sharp, stout thorns which extend to a slight sinuosity found at the beginning of the upper third of the dorsal margin: from this point extends a row of spinules followed by a number of nodules from the largest of which the long abdominal setae emerge. Each side of the anterior margin of the post-abdomen is marked by three

equally distributed combs of spinules, each comb embracing from seven to ten spinules.

The terminal claw is long, slightly curved, and armed by a row of very fine denticles, there being one small secondary tooth near the middle of the claw. There are four nodular abdominal processes, each furnished with a brush of stiff spines, the anterior more prominent process being provided with a larger cluster of spines. No males are found in the collection.

DAPHNIA PULEX var. *NASUTUS* Herrick

The animal described and figured by Herrick (84: 57, Pl. N. figs. 1 to 4) under the above name is found in St. Mary's lake. It has an average length of 1.1 to 1.2 mm. The peculiarity of the beak, suggesting to Herrick the appearance of the "Roman nose" is noticeable in the forms examined. The abdominal processes are hairy and the two anterior ones less divergent than is indicated in the original figure. There are twelve anal teeth curving upward. The claw is rather strongly curved and armed at its proximal half with twelve short, sharp teeth that decrease dorsad. Five eggs were seen in many of the females: no males appear in the collection.

DAPHNIA SCHOEDLERI Sars

Scarcely any two writers agree on the description of this species. My specimens approach most nearly Stingelin's diagnosis (95: 196-197). The forehead however is prominent, while Stingelin describes it as without prominence. The eye lies so near the margin as to give a slight projection immediately in front. The beak is long and pointed, projecting obliquely downward; there is a slight concavity between the forehead and the end of the beak. The specimens measured have an average of 1.7 mm. in length and only 0.95 mm. in height; in other respects the animal agrees with that of Stingelin.

SIMOCEPHALUS SERRULATUS Koch.

Our specimens differ from the described forms, particularly Birge's *S. serrulatus* which he formerly called *S. americanus* (78: 82-84, Pl. 1, fig. 6) in having the antero-frontal portion of the head to which the thorns are attached rounding rather than in the form of an acute angle. The caudal teeth emerging from the truncated portion of the post-abdomen are, in the animals observed, fourteen in number,

gradually decreasing in size from the claw posteriad; in other regards our form does not differ from those described.

MOINA BRACHIATA Jur.

A few of these were found in a small pond at York. It is with some doubt that they are referred to this species as they do not answer exactly to the characteristics of any of the *Moina* group, but they approach so nearly Stingelin's diagnosis (95: 219-220, fig. 20) that I venture to put them under the above name rather than to assign them a new place. The shell is indistinctly marked by lines crossing each other irregularly, very similar to the sculpturing of the shell in *M. Lilljeborgii* Schoedl. as figured by Lilljeborg (53: 38, Pl. 2, fig. 4f). The males bear a striking resemblance in outline and in form of the antennule to the male of *M. affinis* Birge (93: 290-291, Pl. 10, fig. 7). Our species departs from Stingelin's description in the following particulars:

	Swiss forms	Nebraska forms
Length—female	1.2-1.6 mm.	1.5-1.65 mm.
male	0.8 mm.	0.88 mm.
Caudal teeth	10	11-12

ALONA COSTATA Sars

This form approaches very closely to the diagnosis and figure of Steuer (01: 124, Pl. 5, fig. 17). It differs, however, in having only ten anal teeth and in having above these a row of very closely set spinules. In points of comparison with *A. guttata* Sars our specimens correspond to Steuer's description.

ALONOPSIS LATISSIMA Kurz

These are abundant in the collections from St. Mary's Lake, Aurora: the average length is 0.45 mm. The general form agrees with that of Herrick and Turner (95: 232-233, Pl. 61, fig. 9) and with Birge's description under *A. media* (78: 108, Pl. 1, figs. 14, 15). By these men no mention is made of the fact that the lower three anal spines are decidedly larger than the others; this is characteristic of the Manitoba specimens of Ross (97: 162), as well as of those found here.

PLEUROXUS UNCINATUS Baird

A few typical representatives of this species, not hitherto reported in this country, were found among the collections from Hackberry

Lake. The animal agrees in general with Baird's description (50: 135, Pl. 17, fig. 4) but differs in having the posterior margin of the carapace truncate instead of rounding and sinuate at the lower margin, as given in Baird's diagnosis. The beak is less procurved than is indicated by the description and the original figure.

The general outline of the body approaches Baird's description of *P. trigonellus* (50: 134, Pl. 17, fig. 3). Baird does not give the length of his specimens but Steuer finds the average length to be 0.538 to 0.568 mm. (01: 126-7, Pl. 5, fig. 23 *a, b*), while our representatives measure from 0.7 to 0.8 mm. in length.

CHYDORUS RUGULOSUS Forbes

This little animal reported in my former paper (01: 169, 170) as quite generally distributed over Nebraska, but as differing in some particulars from Forbes' description (90: 712), has been found among the collections from Sidney; the specimens of recent collection show exact conformity to Forbes' diagnosis and figure.

OTHER SPECIES

The other species of this report not referred to in the above notes, agree so perfectly with the descriptions and figures of American and European writers as to make comment upon them quite unnecessary.

WORKS CITED

- BAIRD, W.
 50. The Natural History of the British Entomostraca. Ray Soc.
- BIRGE, E. A.
 78. Notes on Cladocera. Trans. Wis. Acad. Sci., IV, 77-110, 2 pl.
 93. Notes on Cladocera, III. Trans. Wis. Acad. Sci., IX, 275-317, 4 pl.
- FORBES, S. A.
 90. On Some Lake Superior Entomostraca. U. S. Comm. of Fish and Fisheries, part 15, Report for 1887, 701-718, 4 pl.
- FORDYCE, CHAS.
 01. The Cladocera of Nebraska. Trans. Amer. Mic. Soc., XXII, 119-175, 4 pl.
- HERRICK, C. L.
 84. A Final Report on the Crustacea of Minnesota included in the Orders Cladocera and Copepoda. 12th Ann. Rep. Geol. and Nat. Hist. Survey, pt. V, 191 pp., 30 pl.
- HERRICK, C. L., and TURNER, C. H.
 95. Synopsis of the Entomostraca of Minnesota with descriptions of related species comprising all known forms from the United States included in the orders Copepoda, Cladocera, Ostracoda. Zool. Ser. II, State Geol. Nat. Hist. Survey Minn., 525 pp., 81 pl.
- LILLJEBORG, W.
 53. De Crustaceis ex ordinibus tribus: Cladocera, Ostracoda et Copepoda, in Scania occurrentibus.
- RICHARD, J.
 96. Revision des Cladoceres, II. Ann. Sci. Nat., zool., Ser. 8, II, 187-363, 6 pl.
- ROSS, L. S.
 97. Some Manitoba Cladocera with Description of one New Species. Proc. Iowa Acad. Sci., IV, 154-162.
- STEUER, A.
 01. Die Etomostrakenfauna der "alten Donau" bei Wien. Zool. Jhrb., Syst., XV, 168 pp., 12 pl.
- STINGELIN.
 95. Die Cladoceren der Umgebung von Basel. Rev. Suisse Zool., III, 161-274, 4 pl.

EXPLANATION OF PLATE VI

- Fig. 1. *Daphnia magna* var. *americana*, lateral view of female. $\times 20$.
 Fig. 2. *Leydigia trichura*, lateral view of female. $\times 90$.
 Fig. 3. *Leydigia trichura*, post-abdomen of female. $\times 300$.

PLATE VI

